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Fourteen New Species of the *Drosophila* (*Drosophila*) *immigrans* Species-group (Diptera) from the Oriental Region

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Abstract Fourteen new species of the *Drosophila* (*Drosophila*) *immigrans* species-group, of which nine belong to the *immigrans* subgroup, one to the *hypocausta* subgroup and four to the *quadrilineata* subgroup, are reported from southern China, Philippines and Sumatra.

Key words: *Drosophila immigrans* species-group; new species; Oriental Region.

The *Drosophila immigrans* species-group comprises the greater part of the drosophilid fauna in the Oriental Region, together with the *D. melanogaster* species-group (THROCKMORTON, 1975; OKADA, 1981). Up to the present, a total of 80 species of this species-group have been reported from the world. Most of them are, however, endemic to the Oriental Region or distributed also in the neighboring regions such as Japan, New Guinea, Australia, Micronesia, Polynesia and some islands of the Indian Ocean, except for only one cosmopolitan species, *D. immigrans* STURTEVANT, 1921. This paper adds 14 new species to this species-group, based on the collections from southern China, Philippines and Sumatra.

Abbreviations of type depositories

EHU: Entomological Institute, Hokkaido University, Sapporo, Japan

GIE: Guangdong Institute of Entomology, Guangzhou, China

IZB: Institute of Zoology, Academia Sinica, Beijing, China

IZT: Institute of Zoology, Academia Sinica, Taipei, Taiwan, China

KIZ: Kunming Institute of Zoology, Academia Sinica, Kunming, China
 MZB: Museum Zoologicum Bogoriense, Bogor, Indonesia

Drosophila immigrans species-subgroup

Drosophila (Drosophila) padangensis ZHANG et TODA, sp. nov.

(Fig. 1)

Diagnosis. Abdominal tergites mostly yellow, slightly brownish on caudal margin. Male fore tarsus with short recurved setae. Hypandrial process broad, short, apically truncate, with numerous spinules on surface (Fig. 1C). Dorsal process of aedeagus broad, distally deeply bifurcated, with many spinules on lateral surface, laterobasally with 1 pair of broad, somewhat triangular, apically serrate flaps (Fig. 1B).

♂, ♀. Head: Eye brownish red. Ocellar triangle dark yellow, with a few setulae; ocelli yellow; ocellar seta long. Frontal vitta brown, anteriorly with a few interfrontal setulae. Fronto-orbital plate dark yellow. Face dark yellow; carina high, broad in lower part, anteriorly not reaching buccal margin. Clypeus brown. Gena dark yellow. Occiput brown. Pedicel brown, with 2 stout setae; 1st flagellomere paler; terminal bifurcation of arista moderate. Palpus yellow, with *ca.* 3 long, stout setae on lateral margin.

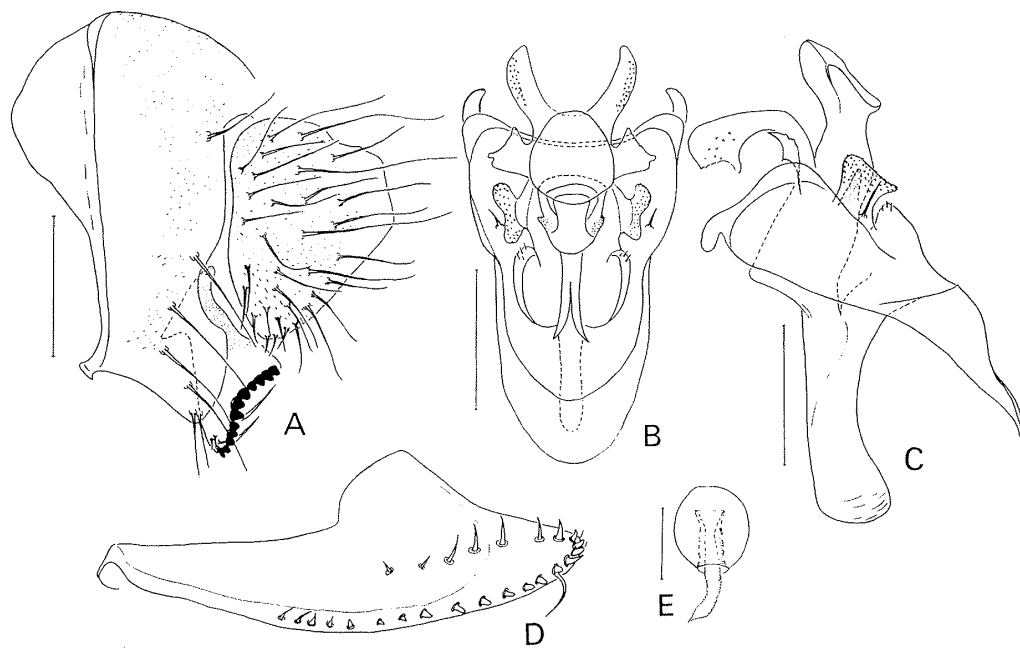


Fig. 1. *Drosophila (Drosophila) padangensis* ZHANG et TODA, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, aedeagus, parameres and hypandrium (ventral view); C, ditto (lateral view); D, oviscapit; E, spermatheca. (Scale-line = 0.1 mm.)

Thorax: Scutum, scutellum and mesopleuron brownish yellow. Postpronotal lobe yellow; postpronotal setae 2, lower one longer. Acrostichal setulae in 8 rows. Basal scutellar setae convergent; apicals convergent and crossed.

Wing hyaline, slightly clouded. Veins brown; r-m crossvein clear; dm-cu clouded. R_{2+3} slightly curved to costa at tip. R_{4+5} and M_1 parallel. C_1 setae 2, upper one longer. Halter pale yellow.

Legs yellow. Fore femur with row of *ca.* 14 (range: 13–15) stout, ctenidial spines. Preapical dorsal setae on all tibiae; apical seta on mid tibia. Fore and mid 1st tarsomeres each with 1 basal ventral seta; hind one with 2 such setae. Fore 1st tarsomere as long as 3 succeeding tarsomeres together; mid and hind 1st tarsomeres each as long as the rest together.

Male terminalia (Fig. 1A–C): Epandrium pale yellow, pubescent in submedial to upper part, with *ca.* 1 seta on upper part and *ca.* 6 on lower part; ventral lobe somewhat round on ventral to caudal margin; anteroventral corner prominent. Surstylus with *ca.* 10 primary prensisetae in concave row on entire length of distal margin, *ca.* 2 long stout spines on inner surface and a few setulae caudoventrally. Cercus oval, almost entirely pubescent, with *ca.* 29 long setae and a few short, stout setae at caudoventral corner. Aedeagus distally expanded like trumpet, laterally with 1 pair of small, acute, sclerotized projections. Paramere somewhat long, smooth, apically with *ca.* 3 setulae. Hypandrium with 1 pair of short paramedian setae near bases of hypandrial processes.

Female terminalia: Oviscapt (Fig. 1D) apically round, submedially much broad, with *ca.* 18 marginal and *ca.* 7 long, apically pointed lateral ovisensilla; anteroventral bridge short, narrow. Spermatheca (Fig. 1E) oval; introversion slightly wrinkled basally to medially; duct distally somewhat expanded.

Measurements: BL (body length) = 2.78 mm (2.65–2.90) in ♂, 3.15 mm in ♀; ThL (thorax length) = 1.28 mm (1.23–1.30) in ♂, 1.50 mm in ♀; WL (wing length) = 2.37 mm (2.30–2.50) in ♂, 2.80 mm in ♀; WW (wing width) = 1.07 mm (1.05–1.10) in ♂, 1.30 mm in ♀.

Indices: arb (dorsal branches of arista/ventral branches of arista) = 6–7/3–4; FW/HW (frontal width/head width) = 0.45 (0.43–0.46); ch/o (maximum width of gena/maximum diameter of eye) = 0.11 (0.10–0.12); prorb (proclinate orbital/posterior reclinate orbital) = 0.73 (0.66–0.80); rcorb (anterior reclinate orbital/posterior reclinate orbital) = 0.44 (0.36–0.50); vb (subvibrissal/vibrissa) = 0.74 (0.62–0.93); dcl (anterior dorsocentral/posterior dorsocentral) = 0.60 (0.56–0.62); sctl (basal scutellar/apical scutellar) = 0.86 (0.81–0.88); sterno (anterior katepisternal/posterior katepisternal) = 0.62 (0.57–0.68); orbito (distance between proclinate and posterior reclinate orbitals/distance between inner vertical and posterior reclinate orbital) = 0.78 (0.60–0.90); dcp (length distance between ipsilateral dorsocentrals/cross distance between ante-

rior dorsocentrals)=0.39 (0.37–0.45); sctlp (distance between ipsilateral scutellars/cross distance between apical scutellars)=1.06 (1.00–1.22); C=3.84 (3.38–4.06); 4c=0.58 (0.51–0.66); 4v=1.29 (1.22–1.42); 5x=1.07 (1.00–1.17); ac=1.78 (1.65–1.89); M=0.33 (0.31–0.37); C3F=0.61 (0.56–0.70).

Holotype ♂, Sumatra: Air Sirah, Padang, 9–15.V.1988, ex banana trap, coll. S. NAKANO (EHU).

Allotype ♀, same data as holotype (EHU).

Paratypes: 3♂, same data as holotype (EHU, KIZ, MZB).

Distribution. Sumatra.

Relationship. This species is closely related to *D. burmae* TODA, 1985 and *D. synpanishi* OKADA, 1964, but distinguishable from these two species by the diagnostic characters, *i.e.*, in *burmae* the hypandrial process smooth on surface; in *synpanishi* the hypandrial process distally tapering and dorsal process of aedeagus laterally with 1 pair of narrow, acute projections.

Etymology. Pertaining to the type locality.

***Drosophila (Drosophila) torquata* ZHANG et TODA, sp. nov.**

(Fig. 2)

Diagnosis. Dm-cu crossvein clear. C3F=0.41 (0.38–0.44). Epandrium

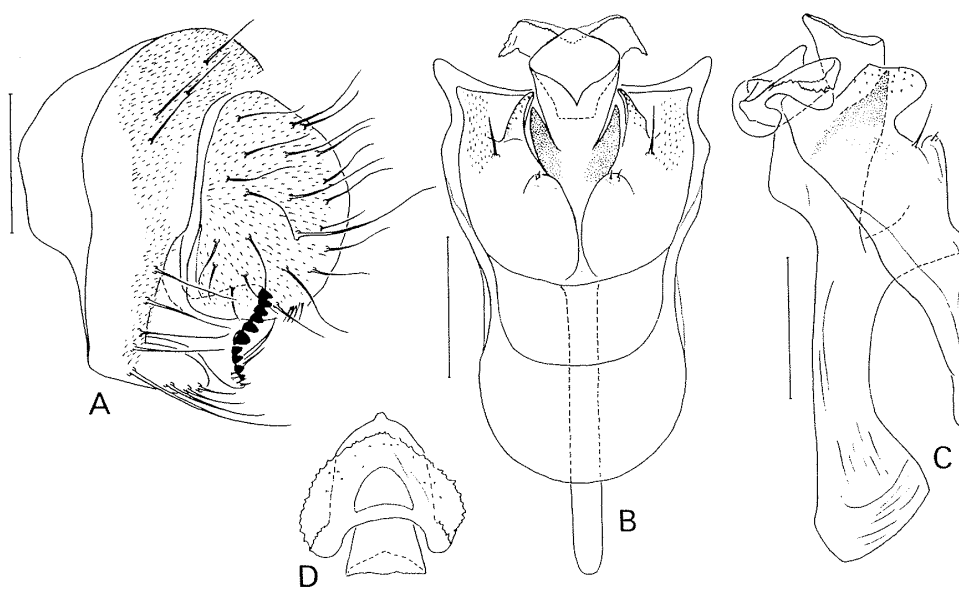


Fig. 2. *Drosophila (Drosophila) torquata* ZHANG et TODA, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, aedeagus, parameres and hypandrium (ventral view); C, ditto (lateral view); D, dorsal process of aedeagus and distiphallus (dorsal view). (Scale-line=0.1 mm.)

narrow in lower part; ventral lobe nearly perpendicular to upper part (Fig. 2A). Aedeagus subapically with 1 pair of sclerotized, triangular, broad plates (Fig. 2C). Dorsal process of aedeagus large, membranous, medially concave, surrounding dorsal portion of distiphallus like collar, serrate on margins and with a few spinules on surface (Fig. 2B–D). Hypandrium pubescent beside hypandrial process and paramedian seta (Fig. 2B).

Some characters commonly seen in the foregoing species, *D. padangensis*, are not referred to in the following description.

♂. Head: Face yellow. Palpus with *ca.* 5 long stout setae on lateral margin and numerous setulae.

Thorax: Postpronotal setae 2, subequal.

Legs: Fore femur with row of *ca.* 10 stout, ctenidial spines.

Male terminalia (Fig. 2A–D): Epandrium pubescent except for anterior margin and ventral lobe, with *ca.* 4 setae on upper part, *ca.* 5 on lower part and *ca.* 3 on ventral lobe. Cercus with *ca.* 22 long setae and tuft of a few short, stout setae at caudoventral corner.

Measurements: BL=2.33 mm (2.30–2.35); ThL=1.18 mm (1.05–1.30); WL=2.18 mm (2.05–2.30); WW=0.91 mm (0.88–0.95).

Indices: arb=5/3; FW/HW=0.45; ch/o=0.14 (0.12–0.16); prorrb=0.77; rcorb=0.44; vb=1.00; dcl=0.50; sterno=0.58 (0.56–0.61); orbito=0.83 (0.77–0.89); dcp=0.28 (0.27–0.30); scrlp=1.00; C=3.57 (3.43–3.72); 4c=0.62; 4v=1.38; 5x=1.20 (1.13–1.28); ac=2.00; M=0.32 (0.31–0.34).

Holotype ♂, Sumatra: Air Sirah, Padang, 9-15.V.1988, ex banana trap, coll. S. NAKANO (EHU).

Paratype: 1♂, same data as holotype (MZB).

Distribution. Sumatra.

Relationship. This species somewhat resembles the foregoing species, *D. padangensis*, in the morphology of hypandrial process, but can be clearly distinguished from the latter and also from its relatives, *D. synpanishi* and *D. burmae*, by the diagnostic characters.

Etymology. Referring to the shape of dorsal process of aedeagus like collar.

Drosophila (Drosophila) eprocessata ZHANG et TODA, sp. nov.

(Fig. 3)

Diagnosis. Male fore tarsus without long, recurved setae. Aedeagus without sclerotized projections laterally (Fig. 3C). Dorsal process of aedeagus narrower than distiphallus, ventromedially slightly concave, apically with many spinules (Fig. 3B, C). Hypandrial process long, somewhat curved ventrad, apically round, with numerous spinules on surface (Fig. 3C).

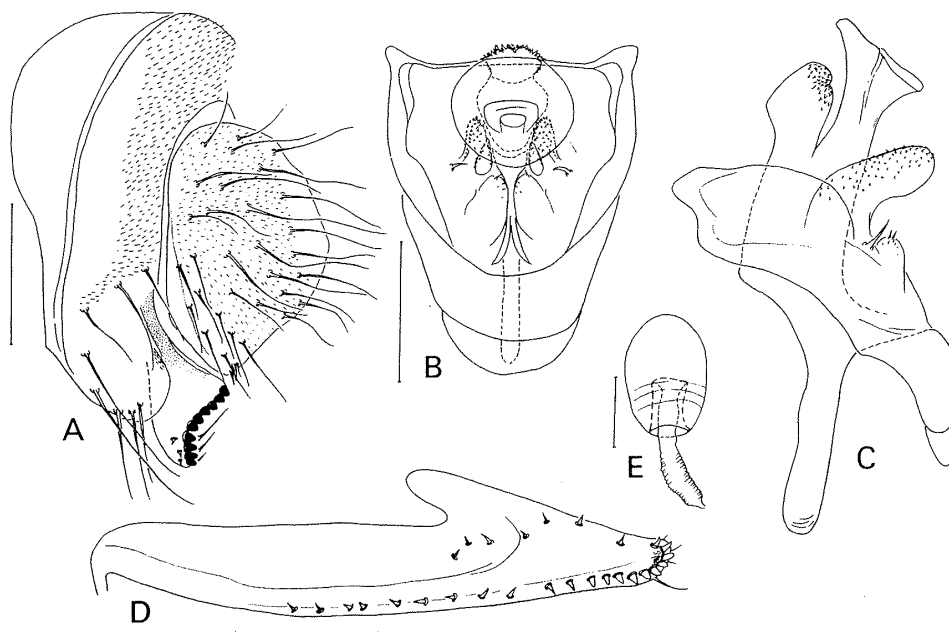


Fig. 3. *Drosophila (Drosophila) eprocessata* ZHANG et TODA, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, aedeagus, parameres and hypandrium (ventral view); C, ditto (lateral view); D, oviscapt; E, spermatheca. (Scale-line=0.1 mm.)

Some characters commonly seen in *D. padangensis* are not referred to in the following description.

♂, ♀. Head: Ocellar triangle yellow. Fronto-orbital plate brown. Gena brown. Occiput dark brown. Palpus with ca. 4 long, stout setae on lateral margin.

Thorax: Basal scutellar setae parallel or slightly divergent.

Wing: Halter brownish yellow.

Legs: Fore femur with row of ca. 10 (9–13) stout, ctenidial spines.

Male terminalia (Fig. 3A–C): Epandrium yellow, with ca. 8 setae on lower part; anterior and posterior margins nearly parallel; ventral lobe round on ventral to caudal margin. Surstylus with ca. 3 long, stout spines on inner surface. Cercus with ca. 31 long setae and tuft of a few short, stout setae at caudoventral corner. Paramere partly fused to hypandrium, apically round and with a few setulae.

Female terminalia: Oviscapt (Fig. 3D) with ca. 21 marginal and ca. 8 lateral ovisensilla. Spermatheca (Fig. 3E) with 3 horizontal wrinkles on lower part of capsule; introvert ca. 2/5 height of capsule.

Measurements: BL=2.64 mm (2.35–2.90) in ♂, 3.10 mm in ♀; ThL=1.31 mm (1.15–1.40) in ♂, 1.55 mm in ♀; WL=2.28 mm (2.10–2.60) in ♂, 3.00 mm in ♀; WW=1.03 mm (0.90–1.10) in ♂, 1.87 mm in ♀.

Indices: arb=5–8/3–4; FW/HW=0.45 (0.42–0.48); ch/o=0.10 (0.07–

0.12); $prorb=0.74$ (0.70–0.83); $rcorb=0.43$ (0.36–0.50); $vb=0.88$ (0.77–0.93); $dcl=0.63$ (0.59–0.69); $sctl=0.93$ (0.80–1.00); $sterno=0.57$ (0.52–0.62); $orbto=0.79$ (0.70–0.90); $dcp=0.38$ (0.33–0.44); $sctlp=0.87$ (0.73–1.00); $C=4.00$ (3.80–4.20) in ♂, 5.00 in ♀; $4c=0.55$ (0.52–0.57) in ♂, 0.46 in ♀; $4v=1.30$ (1.24–1.36); $5x=1.06$ (0.90–1.22); $ac=1.75$ (1.67–1.83) in ♂, 1.42 in ♀; $M=0.34$ (0.31–0.35); $C3F=0.58$ (0.53–0.62).

Holotype ♂, Sumatra: Air Sirah, Padang, 9–15.V.1988, ex banana trap, coll. S. NAKANO (EHU).

Allotype ♀, same data as holotype (EHU).

Paratypes: 4♂, same data as holotype (EHU, KIZ, MZB).

Distribution. Sumatra.

Relationship. This species is related to *D. synpanishi* and the two foregoing new species, *D. padangensis* and *D. torquata*, in having the hypandrial process with numerous spinules on surface, but clearly distinguishable from them by the diagnostic characters.

Etymology. Referring to the absence of lateral, sclerotized projections on aedeagus.

***Drosophila (Drosophila) minangkabau* ZHANG et TODA, sp. nov.**

(Fig. 4)

Diagnosis. Acrostichal setulae in 6 rows. $C3F=0.84$. Paramedian setae absent on hypandrium (Fig. 4B). Dorsal process of aedeagus distally dilated, bilobed and with many spinules, basally with 1 pair of long acute

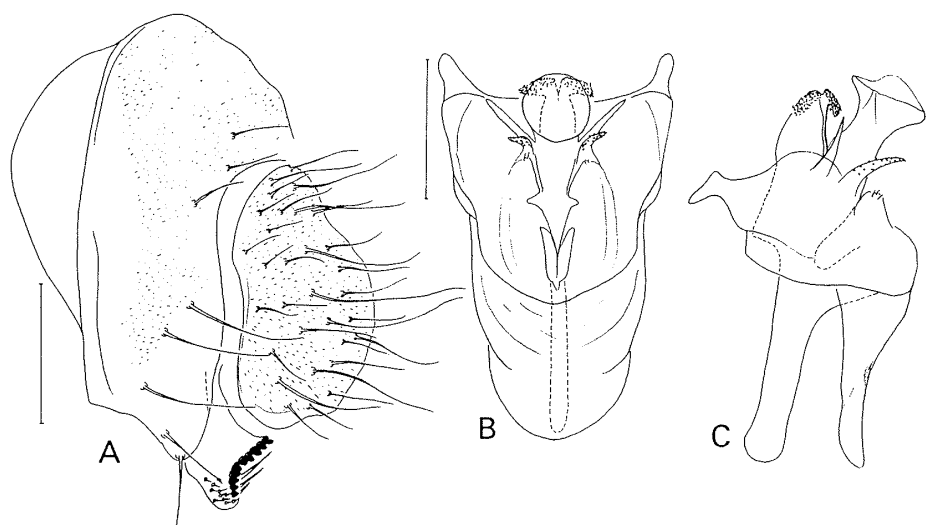


Fig. 4. *Drosophila (Drosophila) minangkabau* ZHANG et TODA, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, aedeagus, parameres and hypandrium (ventral view); C, ditto (lateral view). (Scale-line=0.1 mm.)

projections (Fig. 4B, C). Hypandrial process slender, apically pointed, with numerous spinules (Fig. 4C).

Some characters commonly seen in *D. padangensis* are not referred to in the following description.

♂. Head: First flagellomere brown. Palpus brownish yellow, with *ca.* 4 long, stout setae on lateral margin.

Thorax: Postpronotal lobe dark yellow; postpronotal setae 2, subequal.

Legs: Fore femur with row of *ca.* 10 stout, ctenidial spines. Male fore tarsus without long, recurved setae.

Abdominal tergites yellow, each with narrow, medially uninterrupted, brown caudal band.

Male terminalia (Fig. 4A–C): Epandrium with *ca.* 3 seta on upper part and *ca.* 5 on lower part. Surstylus with *ca.* 2 long and 1 short, stout spines on inner surface. Cercus with *ca.* 32 long setae but no short, stout setae at caudoventral corner. Aedeagus without sclerotized projections laterally.

Measurements: BL=2.50 mm; ThL=1.20 mm; WL=2.10 mm; WW=0.95 mm.

Indices: arb=7–8/4–5; FW/HW=0.44; ch/o=0.09; pror=0.63; rcorb=0.36; vb=0.85; dcl=0.61; sctl=0.79; sterno=0.65; orbito=0.66; dcp=0.40; sctlp=0.88; C=2.79; 4c=0.73; 4v=1.27; 5x=1.00; ac=2.10; M=0.31.

Holotype ♂, Sumatra: Air Sirah, Padang, 9–15.V.1988, ex banana trap, coll. S. NAKANO (EHU).

Distribution. Sumatra.

Relationship. This species is related to the foregoing species, *D. eprocessata*, in the absence of recurved setae on ♂ fore tarsus and lateral, sclerotized projections on aedeagus, but clearly distinguishable from the latter by the diagnostic characters.

Etymology. After the racial name of people living around Padang.

Drosophila (Drosophila) bimaculata ZHANG et TODA, sp. nov.

(Fig. 5)

Diagnosis. Fifth and 6th abdominal tergites each with 2 brown spots. Vb=0.33 (0.25–0.40). Hypandrial process small, smooth (Fig. 5B).

Some characters commonly seen in *D. padangensis* are not referred to in the following description.

♂, ♀. Head: Eye pale red. Ocellar triangle yellow. Frontal vitta yellow but darker than ocellar triangle, anteriorly paler. Fronto-orbital plate yellow. Face yellow; carina high, narrow. Clypeus yellow. Gena yellow. Occiput yellow. Pedicel yellow; 1st flagellomere pale; terminal bifurcation of arista large. Palpus with *ca.* 4 long, stout setae on lateral margin.

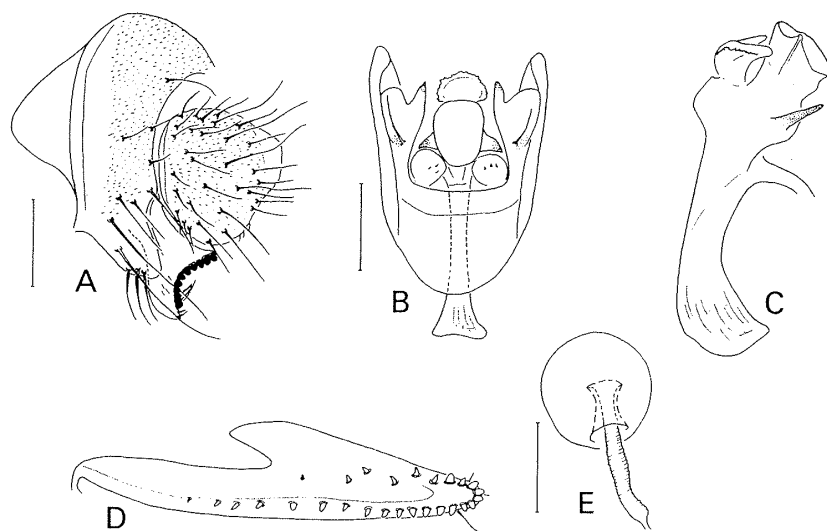


Fig. 5. *Drosophila (Drosophila) bimaculata* ZHANG et TODA, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, aedeagus, parameres and hypandrium (ventral view); C, ditto (lateral view); D, oviscapt; E, spermatheca. (Scale-line=0.1 mm.)

Thorax entirely yellow. Postpronotal setae 2, subequal.

Wing hyaline. Crossveins clear.

Legs: Fore femur with row of ca. 7–9 stout, ctenidial spines. Terminal tarsomeres brownish.

Male terminalia (Fig. 5A–C): Epandrium with ca. 12 setae. Surstylus with ca. 11 primary prensisetae in concave row on entire length of distal margin and ca. 2 long, stout spines and a few setulae caudoventrally. Cercus with ca. 32 long setae and a few setulae caudoventrally. Aedeagus laterally with 1 pair of narrow, sclerotized projections. Dorsal process of aedeagus concave medially, serrate on dorsal margin. Paramedian seta moderate in length.

Female terminalia: Oviscapt (Fig. 5D) with ca. 22 marginal and ca. 5 lateral ovisensilla. Spermatheca (Fig. 5E) spherical; introvert ca. 1/2 height of capsule.

Measurements: BL=2.84 mm (2.75–2.93) in ♂, 3.15 mm in ♀; ThL=1.30 mm (1.25–1.35) in ♂, 1.50 mm in ♀; WL=2.36 mm (2.33–2.40) in ♂, 2.83 mm in ♀; WW=1.03 mm (1.00–1.05) in ♂, 1.20 mm in ♀.

Indices: arb=4–5/4; FW/HW=0.45; ch/o=0.11 (0.10–0.11); pror=0.73 (0.70–0.75); rcorb=0.33 (0.27–0.37); dcl=0.66 (0.65–0.68); sctl=0.86 (0.80–0.90); sterno=0.56 (0.53–0.62); orbito=0.76 (0.60–0.88); dcp=0.35 (0.33–0.37); sctlp=0.87 (0.77–0.94); C=3.96 (3.75–4.26); 4c=0.56 (0.50–0.60); 4v=1.35 (1.28–1.42); 5x=1.17 (1.05–1.31); ac=1.85 (1.67–1.88); M=0.34 (0.32–0.36); C3F=0.67 (0.64–0.70).

Holotype ♂, Sumatra: Air Sirah, Padang, 9–15.V.1988, ex banana trap, coll. S. NAKANO (EHU).

Allotype ♀, same data as holotype except for the date of collecting, 9.V. 1988 (EHU).

Paratype: 1♂, same data as holotype (MZB).

Distribution. Sumatra.

Relationship. This species resembles *D. torquata* in the shape of dorsal process of aedeagus, but can be distinguished from the latter by the diagnostic characters.

Etymology. Referring to the 2 brown spots on each of 5th and 6th abdominal tergites.

Drosophila (Drosophila) afoliolata ZHANG et TODA, sp. nov.

(Fig. 6)

Diagnosis. CuA₁ clear between dm-cu and wing margin. Male fore leg with thick hair tuft on distal 2/3 inner side of 1st tarsomere; 1st tarsomere as long as 2 succeeding tarsomeres together. Aedeagus medioventrally without fan-shaped flap between lateral and ventral projections, slightly serrate on distal margin (Fig. 6D).

Some characters commonly seen in the foregoing species, *D. bimaculata*, are not referred to in the following description.

♂. Head: Eye pale red. Ocellar triangle yellow, brown on inside margins of ocelli. Facial carina low in upper part, high in lower part. Clypeus dark yellow. Gena brown, yellow at base of vibrissa. Occiput yellow,

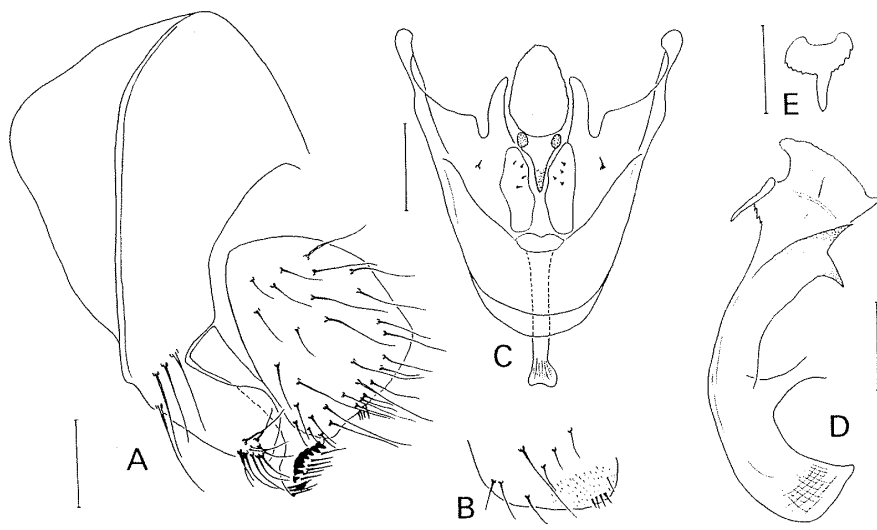


Fig. 6. *Drosophila (Drosophila) afoliolata* ZHANG et TODA, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, ventral part of cercus (ventral view); C, aedeagus, parameres and hypandrium (ventral view); D, aedeagus (lateral view); E, dorsal process of aedeagus (dorsal view). (Scale-line=0.1 mm.)

medially brownish. Pedicel dark yellow. Palpus with *ca.* 3 long, stout setae on lateral margin and a few setulae.

Thorax: Mesopleuron pale yellow on lower part.

Wing: R-m crossvein clear; dm-cu clouded.

Legs: Fore femur with row of *ca.* 10 stout, ctenidial spines on distal 3/5. Male fore tarsus anteriorly with thin, recurved setae on entire length.

Abdominal tergites yellow.

Male terminalia (Fig. 6A-E): Epandrium dorsally broad, ventrally narrow, deeply concaved at insertion of surstylus, entirely not pubescent, with *ca.* 4 long, stout setae near insertion of surstylus and *ca.* 11 short setae on ventral lobe. Surstylus with *ca.* 7 primary prensisetae in concave row on upper to middle distal margin, *ca.* 5-6 long, stout spines on inner surface and numerous setae caudoventrally. Cercus caudoventrally pubescent, with *ca.* 31 long setae and tuft of setulae at caudoventral corner. Aedeagus medioventrally with short, acute, sclerotized projection in addition to 1 pair of similar lateral ones. Dorsal process of aedeagus mediocaudally with elongate, apically somewhat pointed projection, laterally with 1 pair of broad, marginally serrate flaps. Paramere long, with *ca.* 4 setulae. Paramedian seta short. Hypandrial process long.

Measurements: BL=3.28 mm; ThL=1.42 mm; WL=2.46 mm; WW=1.13 mm.

Indices: arb=9/4; FW/HW=0.50; ch/o=0.09; prorb=0.69; rcorb=0.46; vb=0.60; dcl=0.67; sctl=0.79; sterno=0.68; orbito=0.54; dcp=0.38; sctlp=1.09; C=4.72; 4c=0.47; 4v=1.32; 5x=1.21; ac=1.50; M=0.36; C3F=0.63.

Holotype ♂, Sumatra: Air Sirah, Padang, 9-15.V.1988, ex banana trap, coll. S. NAKANO (EHU).

Distribution. Sumatra.

Relationship. This species is closely related to *D. pentafuscata* GUPTA et KUMAR, 1986, but clearly distinguishable from the latter by the diagnostic characters.

Etymology. Referring to the absence of medioventral, fan-shaped flap between lateral and ventral projections on aedeagus.

Drosophila (Drosophila) ichinosei ZHANG et TODA, sp. nov.

(Fig. 7)

Diagnosis. Dm-cu crossvein clear. Epandrium ventrally with *ca.* 6 normal, long setae; 2 apicals not stout (Fig. 7A). Surstylus somewhat triangular, elongate below, with 2 rows of stout setae: outer row consisting of *ca.* 16 short, apically round primary prensisetae which are ventrally reduced in size;

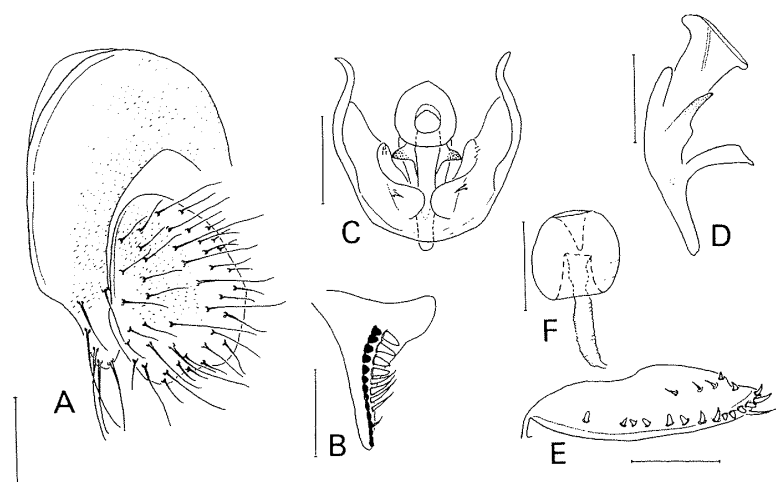


Fig. 7. *Drosophila (Drosophila) ichinosei* ZHANG et TODA, sp. nov. A, Epandrium and cercus (lateral view); B, surstylus; C, aedeagus, parameres and hypandrium (ventral view); D, aedeagus (lateral view); E, oviscapt; F, spermatheca. (Scale-line=0.1 mm.)

inner row consisting of *ca.* 9 long, apically pointed setae which are ventrally reduced in width and becoming spine-like (Fig. 7B). Dorsal process of aedeagus with minute spinules on distal surface (Fig. 7D).

Some characters commonly seen in *D. bimaculata* are not referred to in the following description.

♂, ♀. Head: Ocellar triangle slightly darker on inside margins of ocelli. Frontal vitta yellow. Facial carina low in upper part, high and broad in lower part. Palpus with *ca.* 3 long, stout setae on lateral margin and a few setulae.

Thorax: Acrostichal setulae in 6 rows.

Legs: Fore femur with row of *ca.* 10 stout, ctenidial spines on distal 2/3. Male fore 1st tarsomere with thick hair tuft on distal 2/3 of inner side and 2 long setae basally and medially.

Abdominal tergites yellow.

Male terminalia (Fig. 7A–D): Epandrium broad dorsally, narrow ventrally, pubescent except for anterior margin and ventral lobe. Cercus pubescent only in anterodorsal to middle part, with *ca.* 42 long setae. Aedeagus distally expanded like trumpet; dorsal process simple-shaped, apically round, flattened flap. Paramere fused to hypandrium, located posteriorly to paramedian seta, with several setulae. Hypandrial process not differentiated.

Female terminalia: Oviscapt (Fig. 7E) with *ca.* 14 marginal and *ca.* 5 lateral ovisensilla. Spermatheca (Fig. 7F) apically deeply indented.

Measurements: BL=2.39 mm in ♂, 2.77 mm (2.58–2.96) in ♀; ThL=1.20 mm in ♂, 1.32 mm (1.26–1.39) in ♀; WL=2.27 mm in ♂, 2.49 mm

(2.39–2.58) in ♀; WW=0.95 mm in ♂, 1.05 mm (1.02–1.07) in ♀.

Indices: arb=5/3; FW/HW=0.46 (0.43–0.50); ch/o=0.07 (0.06–0.08); prorb=0.93 (0.80–1.00); rcorb=0.43 (0.40–0.50); vb=0.40 (0.38–0.44); dcl=0.60 (0.55–0.70); sctl=0.77 (0.75–0.79); sterno=0.47 (0.43–0.50); orbito=0.67 (0.57–0.74); dcp=0.40 (0.36–0.44); sctlp=0.80 in ♂, 1.24 (1.22–1.25) in ♀; C=4.88 in ♂, 5.51 (5.25–5.78) in ♀; 4c=0.47 (0.44–0.49); 4v=1.33 (1.29–1.44); 5x=0.87 (0.82–0.95); ac=1.25 (1.14–1.33); M=0.27 (0.25–0.30); C3F=0.52 (0.50–0.56).

Holotype ♂, Philippines: Mt. Maquiling, Luzon, ca. 500 m alt., 14–21.I. 1991, ex banana trap, coll. K. ICHINOSE (EHU).

Allotype ♀, same data as holotype except for the date of collecting, 4–11. II.1991 (EHU).

Paratype: 1 ♀, same data as holotype (KIZ).

Distribution. Philippines (Luzon).

Relationship. This species is closely related to *D. metasetigerata* GUPTA et KUMAR, 1986 and *D. kitagawai* TODA, 1986, but distinguishable from them by the diagnostic characters, i.e., in *metasetigerata* the dm-cu clouded, 2 setae at ventral apex of epandrium stout; in *kitagawai* the surstylus with ca. 8 or 9 primary prensisetæ in a slightly oblique row on upper to middle distal margin but not inner row of stout setae.

Etymology. Patronym, in honor of Dr. Katsuya ICHINOSE, Japan International Research Center for Agricultural Sciences, who collected the specimens.

Drosophila (Drosophila) serrulata ZHANG et TODA, sp. nov.

(Fig. 8)

Diagnosis. Dm-cu crossvein clear. Epandrium with ca. 2 setae near insertion of surstylus and ca. 2 near apex of ventral lobe (Fig. 8A). Aedeagus with distinct dorsal process apically bilobed and serrate on margin, medioventrally swollen but without flattened appendage (Fig. 8C, D).

Some characters commonly seen in *D. bimaculata* are not referred to in the following description.

♂. Head: Ocellar triangle brown on inside margins of ocelli. Frontal vitta orange yellow. Facial carina low in upper part, high in lower part. Clypeus brown. Occiput medially brownish. Pedicel brown; 1st flagellomere pale yellow; terminal bifurcation of arista moderate.

Thorax entirely orange yellow.

Wing: Halter white.

Legs: Fore femur with row of ca. 12–14 stout, ctenidial spines on distal 3/5.

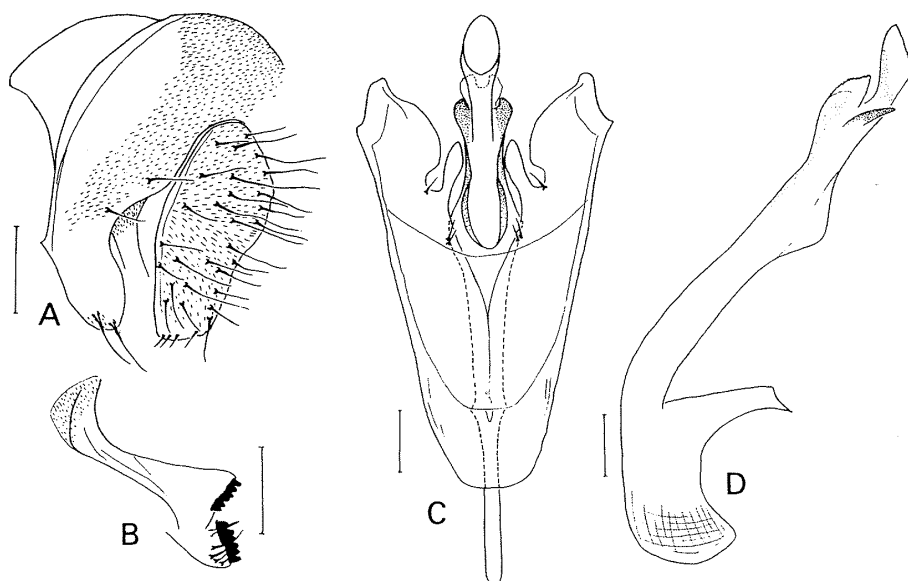


Fig. 8. *Drosophila (Drosophila) serrulata* ZHANG et TODA, sp. nov. A, Epandrium and cercus (lateral view); B, surstylus; C, aedeagus, parameres and hypandrium (ventral view); D, aedeagus (lateral view). (Scale-line=0.1 mm.)

Abdominal tergites yellow.

Male terminalia (Fig. 8A–D): Epandrium broad dorsally, narrow ventrally. Surstylus concave on distal margin, with 2 sets of primary prensisetae, *i.e.*, *ca.* 6 on upper distal margin and *ca.* 6 slightly larger ones on lower distal margin, and *ca.* 6 long setae on lower inner surface. Cercus oval above and somewhat oblong below, with *ca.* 28 long setae and a few short, stout setae on ventral margin. Aedeagus much elongated; apodeme broad in lateral view. Paramere fused to hypandrium, with 2 setulae. Hypandrium with 1 pair of small paramedian setae at bases of elongate, apically round hypandrial processes.

Measurements: BL=3.53 mm; ThL=1.64 mm; WL=2.90 mm; WW=1.32 mm.

Indices: arb=6/4; FW/HW=0.47; ch/o=0.09; pror=0.86; rcorb=0.57; vb=0.89; sterno=0.69; orbito=0.60; dcp=0.32; sctlp=1.17; C=3.52; 4c=0.57; 4v=1.23; 5x=1.03; ac=1.93; M=0.30; C3F=0.71.

Holotype ♂, Sumatra: Air Sirah, Padang, 9.V.1988, ex banana trap, coll. S. NAKANO (EHU).

Distribution. Sumatra.

Relationship. This species is closely related to *D. taiensis* KUMAR et GUPTA, 1988, but clearly distinguishable from the latter by the diagnostic characters.

Etymology. Referring to the fine serrations on distal margin of dorsal process of aedeagus.

Drosophila (Drosophila) aplophallata ZHANG et TODA, sp. nov.

(Fig. 9)

Diagnosis. Dorsal process of aedeagus vestigial, triangular in lateral view (Fig. 9C). Hypandrial process small, somewhat triangular (Fig. 9C).

Some characters commonly seen in *D. bimaculata* are not referred to in the following description.

♂, ♀. Head: Eye tannish red. Ocellar triangle brown. Frontal vitta yellow to yellowish brown. Fronto-orbital plate anteriorly with a few setulae. Facial carina high, anteriorly broad. Clypeus brown. Gena yellow to brownish yellow. Occiput brown. Terminal bifurcation of arista moderate. Palpus with ca. 3 long, stout setae apically, subapically and laterally.

Thorax: Scutum, scutellum and mesopleuron brownish yellow. Postpronotal lobe yellow. Basal scutellar setae slightly convergent or parallel.

Wing: Dm-cu crossvein slightly clouded. C₁ seta 1. Halter white.

Legs: Fore femur with row of ca. 8 (7–11) stout, ctenidial spines. Male fore tarsus with long, recurved setae. Fore 1st tarsomere slightly shorter than 3 succeeding tarsomeres together; mid and hind 1st tarsomeres each slightly longer than 3 succeeding together.

Abdominal tergites yellow.

Male terminalia (Fig. 9A–C): Epandrium pubescent except for anteromedial and caudoventral parts, with ca. 7 setae on lower part; ventral lobe less differentiated. Surstylus somewhat quadrate, with ca. 12 primary prensisetae

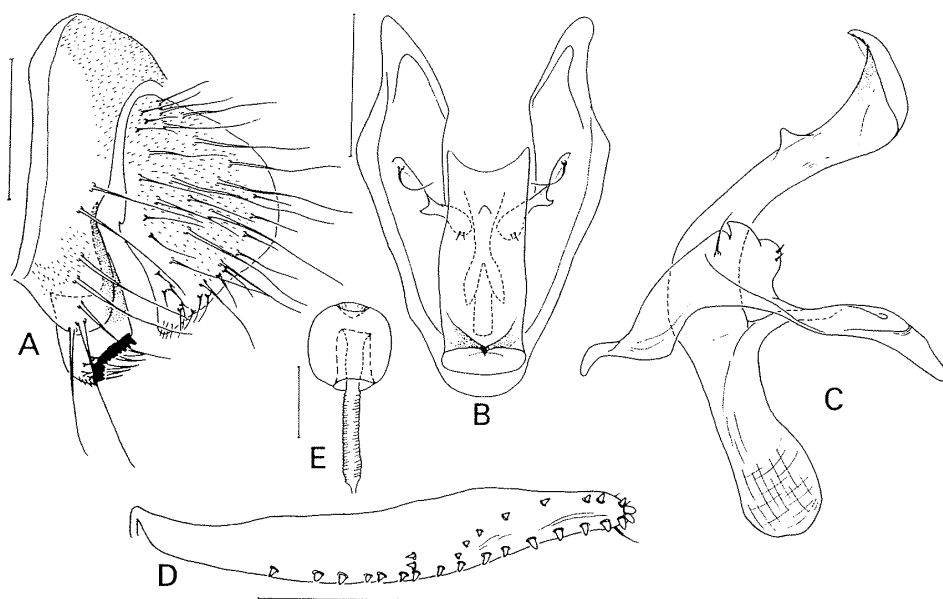


Fig. 9. *Drosophila (Drosophila) aplophallata* ZHANG et TODA, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, aedeagus, parameres and hypandrium (ventral view); C, ditto (lateral view); D, oviscapit; E, spermatheca. (Scale-line=0.1 mm.)

slightly decreasing downward in size and arranged in concave row on entire length of distal margin, *ca.* 5 long, stout spines on inner surface and a few setulae caudoventrally. Cercus broad, somewhat triangular, pubescent except for caudal to ventral margin, with *ca.* 37 long setae and tuft of short, thin setulae at caudoventral corner. Aedeagus long, gently curved ventrad, dorso-apically expanded, slightly sclerotized and somewhat pointed at tip. Paramere small, roundish, partly fused to hypandrium, with a few setulae.

Female terminalia: Oviscapt (Fig. 9D) yellow, with *ca.* 19 marginal and *ca.* 9 lateral ovisensilla. Spermatheca (Fig. 9E) apically shallowly indented; introvert *ca.* 3/4 height of capsule.

Measurements: BL=2.70 mm (2.50–2.95) in ♂, 2.90 mm (2.50–3.15) in ♀; ThL=1.28 mm (1.20–1.35) in ♂, 1.38 mm (1.20–1.50) in ♀; WL=2.35 mm (2.25–2.45) in ♂, 2.50 mm (2.30–2.65) in ♀; WW=1.00 mm (0.90–1.05) in ♂, 1.11 mm (1.05–1.20) in ♀.

Indices: arb=4–5/2–3; FW/HW=0.47 (0.46–0.51) in ♂, 0.48 (0.46–0.50) in ♀; ch/o=0.21 (0.18–0.23); prorb=0.84 (0.71–1.00); rcorb=0.44 (0.36–0.55); vb=0.89 (0.66–1.00); dcl=0.66 (0.63–0.76); sctl=0.81 (0.65–0.90); sterno=0.64 (0.55–0.73); orbito=0.78 (0.70–0.90); dcp=0.36 (0.31–0.41); sctlp=1.15 (1.06–1.28); C=3.80 (3.73–4.00) in ♂, 4.47 (4.18–5.00) in ♀; 4c=0.53 (0.48–0.60); 4v=1.41 (1.32–1.50); 5x=0.95 (0.80–1.14); ac=1.54 (1.33–1.77); M=0.30 (0.26–0.34); C3F=0.35 (0.29–0.42).

Holotype ♂, Philippines: Mt. Maquiling, Luzon, *ca.* 500 m alt., 21–28.I.1991, ex banana trap, coll. K. ICHINOSE (EHU).

Allotype ♀, same data as holotype (EHU).

Paratypes: Mt. Maquiling, Luzon, Philippines, *ca.* 500 m alt., ex banana traps, coll. K. ICHINOSE: 1 ♀, 14–21.I.1991; 4 ♀, 21–28.I.1991; 1 ♂, 3 ♀, 28.I–4.II.1991; 1 ♀, 4–11.II.1991; 2 ♂, 1 ♀, 11–20.II.1991 (EHU, KIZ).

Distribution. Philippines (Luzon).

Relationship. This species certainly belongs to the *D. immigrans* species-subgroup, because of the ♂ fore tarsus is ornamented with long, recurved setae, the aedeagus is dorsosubmedially provided with characteristic process and the hypandrium with 1 pair of distinct processes on inner margins, although the last two characters are vestigial.

Etymology. Referring to the rather simple structure of aedeagus.

Drosophila hypocausta species-subgroup

Drosophila (Drosophila) nakanoi ZHANG et TODA, sp. nov.

(Fig. 10)

Diagnosis. Body color generally brown in both sexes, without strong

sexual dimorphism. Fore femur with row of *ca.* 8 (7–11) stout, black, ctenidial spines on distal 1/2 of inner side. Acrostichal setulae in 10 rows. Male fore tarsus anteriorly with long, recurved setae; 1st tarsomere with thick hair tuft on distal 2/3 of inner side. Aedeagus ventrolaterally with 1 pair of sclerotized, apically pointed edges (Fig. 10B, C).

♂, ♀. Head: Eye tannish red. Ocellar triangle dark brown, with a few setulae; ocelli yellow; ocellar seta long. Frontal vitta yellow, anteriorly with a few interfrontal setulae. Fronto-orbital plate yellow. Face yellow, brownish on anterior margin; carina high, narrow in upper part, broad in lower part. Clypeus brown. Gena yellow, brownish on lower margin. Occiput brown. Pedicel yellow, with 2 long and 1 short, stout setae; 1st flagellomere paler; terminal bifurcation of arista moderate. Palpus yellow, with *ca.* 2 or 3 long, stout apical and subapical setae, and a few setulae.

Thorax: Scutum brown, yellowish along middle and dorsocentral lines. Scutellum brown, anteromedially paler. Postpronotal lobe brownish yellow; postpronotal setae 2, subequal. Mesopleuron brown. Basal scutellar setae convergent; apicals convergent and crossed.

Wing hyaline. R-m crossvein clear; dm-cu slightly clouded. R_{2+3} slightly curved to costa at tip. R_{4+5} and M_1 parallel. C_1 setae 2; upper one longer and stout. Halter pale yellow; stem laterally brownish.

Legs brownish yellow. Preapical dorsal setae on all tibiae; apical seta on

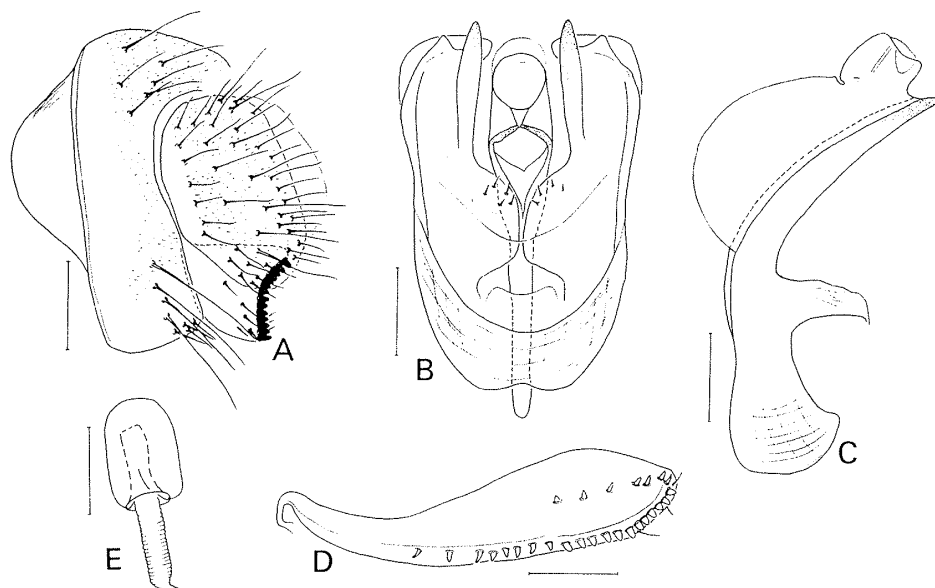


Fig. 10. *Drosophila (Drosophila) nakanoi* ZHANG et TODA, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, aedeagus, parameres and hypandrium (ventral view); C, aedeagus (lateral view); D, oviscapt; E, spermatheca. (Scale-line=0.1 mm.)

mid tibia. Fore 1st tarsomere as long as 2 (♂) or 3 (♀) succeeding tarsomeres together; mid and hind 1st tarsomeres each as long as the rest together.

Abdomen: First to 4th tergites yellow, each with medially interrupted, laterally protruded, brown, broad caudal band; 5th entirely brown.

Male terminalia (Fig. 10A–C): Epandrium nearly parallel-sided, somewhat truncate below, pubescent except for ventral and anterolateral parts, with *ca.* 7 setae on upper part and *ca.* 4 long and *ca.* 4 short setae on lower part. Surstylus broad, with *ca.* 14 primary prensisetae in slightly concave row along almost entire length of distal margin, a few setulae on inner surface and a few short setae on outer surface. Cercus oval, pubescent except for anterior and ventral margins, with *ca.* 44 long setae. Aedeagus dorsally broadly swollen; distiphallus cylindrical. Paramere completely fused to hypandrium, with *ca.* 5 setulae. Hypandrium rectangular, pubescent near parameres, with 1 pair of very long, distally sclerotized hypandrial processes but no paramedian setae.

Female terminalia: Oviscapt (Fig. 10D) apically round, with *ca.* 20 marginal and *ca.* 7 lateral ovisensilla; anteroventral bridge short, narrow. Spermatheca (Fig. 10E) much longer than wide; introvert *ca.* 3/4 height of capsule.

Measurements: BL = 3.49 mm (3.30–3.80) in ♂, 3.87 mm (3.65–4.15) in ♀; ThL = 1.59 mm (1.55–1.65) in ♂, 1.64 mm (1.55–1.70) in ♀; WL = 2.68 mm (2.60–2.80) in ♂, 2.88 mm (2.75–2.98) in ♀; WW = 1.28 mm (1.25–1.35) in ♂, 1.32 mm (1.20–1.38) in ♀.

Indices: arb = 4–5/3–4; FW/HW = 0.44 (0.42–0.49); ch/o = 0.08 (0.06–0.09); prorb = 0.88 (0.81–1.00); rcorb = 0.53 (0.44–0.65); vb = 0.91 (0.85–0.95); dcl = 0.62 (0.57–0.66); sclt = 0.82 (0.75–0.88); sterno = 0.61 (0.55–0.73); orbito = 0.99 (0.85–1.09); dcp = 0.62 (0.57–0.66); scltp = 1.46 (1.25–1.71); C = 4.33 (3.89–4.94); 4c = 0.51 (0.44–0.55); 4v = 1.28 (1.22–1.43); 5x = 1.08 (0.95–1.20); ac = 1.69 (1.45–1.89); M = 0.33 (0.30–0.39); C3F = 0.47 (0.41–0.50).

Holotype ♂, Sumatra: Air Sirah, Padang, 9.V.1988, ex banana trap, coll. S. NAKANO (EHU).

Allotype ♀, same data as holotype (EHU).

Paratypes: 3♂, 4♀, same data as holotype except for the date of collecting, 9–15.V.1988 (EHU, KIZ, MZB).

Distribution. Sumatra.

Relationship. We assign this species to the *D. hypocausta* species-subgroup, based upon combination of the following characters: hypandrium with 1 pair of distinct hypandrial processes; dorsal process of aedeagus not differentiated; and paramere completely fused to hypandrium, although this species has the ctenidial spines on inner side of fore femur and does not show the distinct sexual dimorphism in body color. This species can be distinguished from other members of the *D. hypocausta* species-subgroup by the other

characters designated in the diagnosis.

Etymology. Patronym, in honor of Dr. Susumu NAKANO, Hiroshima Shûdo University, who collected the specimens.

Drosophila quadrilineata species-subgroup

Drosophila (Drosophila) nigridentata WATABE, TODA et PENG, sp. nov.

(Fig. 11)

Diagnosis. Legs nearly entirely yellow, without annuli; fore coxa basally with dark brown marking; ♂ fore tibia and tarsus blackish brown. Cerci caudoventrally connected with each other by less sclerotized, narrow bridge bearing *ca.* 13 tooth-like, black, stout setae (Fig. 11B).

♂. Head: Eye red. Frontal vittae yellow, with 1 pair of anteriorly convergent, brown stripes and several interfrontal setulae anteriorly. Face yellowish brown; carina narrow. Clypeus yellowish brown, medially with small black patch. Gena brown. Pedicel dark brown, with 2 stout setae; 1st flagellomere grayish brown. Palpus brown, with 1 prominent apical seta.

Thorax: Scutum yellow, with 4 pairs of longitudinal, brown stripes and median obscure one: 1 pair along dorsocentral lines, 1 pair on postpronotal

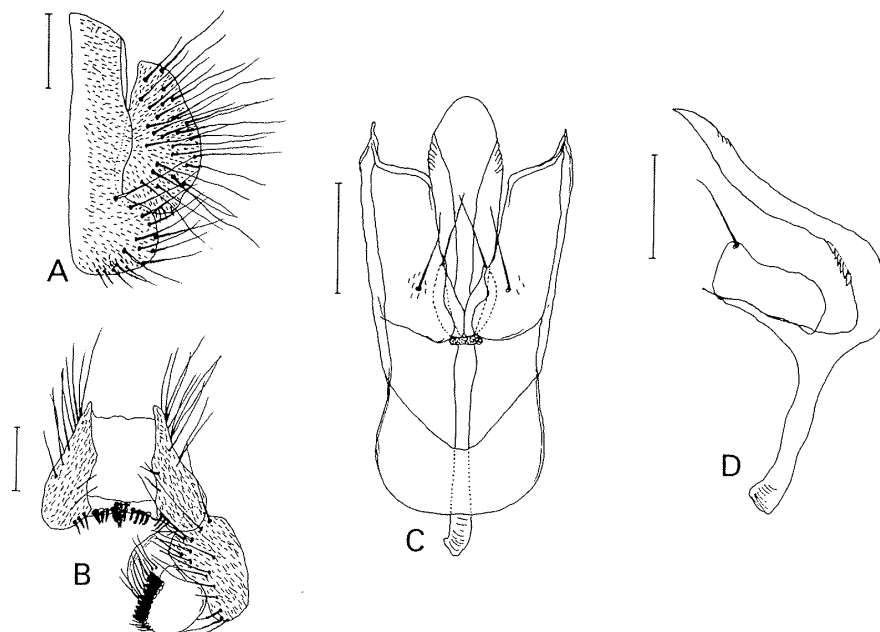


Fig. 11. *Drosophila (Drosophila) nigridentata* WATABE, TODA et PENG, sp. nov. A, Epandrium and cercus (lateral view); B, surstylus, cerci and ventral lobe of epandrium (caudoventral view); C, aedeagus, parameres and hypandrium (ventral view); D, aedeagus and paramere (lateral view). (Scale-line=0.1 mm.)

lobes, 2 pairs on lateral sides. Scutellum yellow, with median obscure stripe running from scutum and 1 pair of posteriorly convergent, brown stripes. Postpronotal setae 2; lower one *ca.* 3/5 length of upper. Acrostichal setulae in 6 regular rows. Middle katepisternal seta subequal (0.91) to length of anterior.

Wing hyaline, slightly yellowish fuscous. Veins brown; r-m crossvein clear; dm-cu slightly clouded. R_{2+3} slightly curved to costa at tip. R_{4+5} and M_1 parallel. C_1 setae 2. Halter whitish yellow, anteriorly darker at base.

Legs: Preapical dorsal setae on all tibiae; apical seta on mid tibia. Fore 1st tarsomere as long as 2 (σ^7) or 3 (φ) succeeding tarsomeres together; mid and hind 1st tarsomeres each as long as the rest together.

Abdominal tergites yellow; 1st narrow, with 1 pair of black spots on lateral margins; 2nd to 6th each with medially interrupted, dark brown caudal band and 1 pair of lateral spots.

Male terminalia (Fig. 11A–D): Epandrium slightly convex at middle on caudal margin, pubescent except for anterior margin; ventral lobe broadly round, with *ca.* 21 long and a few small setae. Surstylus dark brown, with *ca.* 9 primary prensisetae on distal margin, *ca.* 10 setae on inner surface and several setulae at caudoventral corner. Cercus separate from epandrium, entirely pubescent, with *ca.* 29 setae. Aedeagus slender, curved ventrad, subapically slightly wrinkled on dorsolateral margins, subbasally with serrations on ventrolateral margins; apodeme *ca.* 5/8 length of aedeagus. Paramere somewhat rectangular in lateral view, with 1 long seta at caudoventral corner. Hypandrium rectangular, slightly pubescent around base of paramedian seta, with 1 pair of long paramedian setae; hypandrial apodeme large, pale yellow; aedeagal guide well developed, brown, distally tapering in lateral view.

Measurements: ThL = 1.24 mm; WL = 3.32 mm.

Indices: arb = 5/2; FW/HW > 1/2; ch/o = 0.23; prorb = 0.88; rcorb = 0.38; vb = 1/2; dcl = 0.42; sterno = 0.71; dcp = 0.53; setlp = 1; C = 4.00; 4c = 0.66; 4v = 1.58; 5x = 1.14; ac = 2.27; C3F = 0.32.

Holotype σ^7 , China: Babaoshan, Guangdong Province, 13.XI.1989, by net sweeping, coll. M. J. TODA (GIE).

Distribution. China (Guangdong).

Relationship. This species is certainly assigned to the *D. quadrilineata* species-subgroup by the distinct longitudinal stripes on frons and thorax and general structure of σ^7 terminalia, but is very unique in having the cercus with ventral lobe bearing many tooth-like, black, stout setae, which may or may not be homologous to the similar structure seen in the members of the *D. curviceps* species-subgroup (ZHANG & TODA, 1992).

Etymology. Referring to the black, tooth-like setae on cercal ventral lobe.

Drosophila notostriata species-complex

Diagnosis. Fore femur with row of larger and smaller ctenidial spines alternating on inner side.

This new species-complex includes four species: *D. notostriata* OKADA, 1966 and the following three new species.

Drosophila (Drosophila) wangi TODA et ZHANG, sp. nov.

(Fig. 12)

Diagnosis. Aedeagus apicoventrally with 1 pair of marginally serrate flaps (Fig. 12C, D). Hypandrium with 2 pairs of small paramedian setae (Fig. 12C). Cercus with tuft of short, stout setae only at caudoventral corner (Fig. 12A).

♂, ♀. Head: Eye pale red. Ocellar triangle yellow, black on inner margins of ocelli, with a few setulae; ocelli yellow; ocellar seta long. Frontal vitta yellow, with brown, longitudinal stripe laterally and a few interfrontal setulae anteriorly. Fronto-orbital plate yellowish white. Face yellow, brown on buccal margin; carina low, narrow. Clypeus brown. Gena yellow, dark brown at bases of vibrissa and subvibrissal seta. Occiput brown. Pedicel brown, with 2 stout setae; 1st flagellomere pale yellow; terminal bifurcation of arista moderate. Palpus brownish yellow, with 2 long, stout apical and subap-

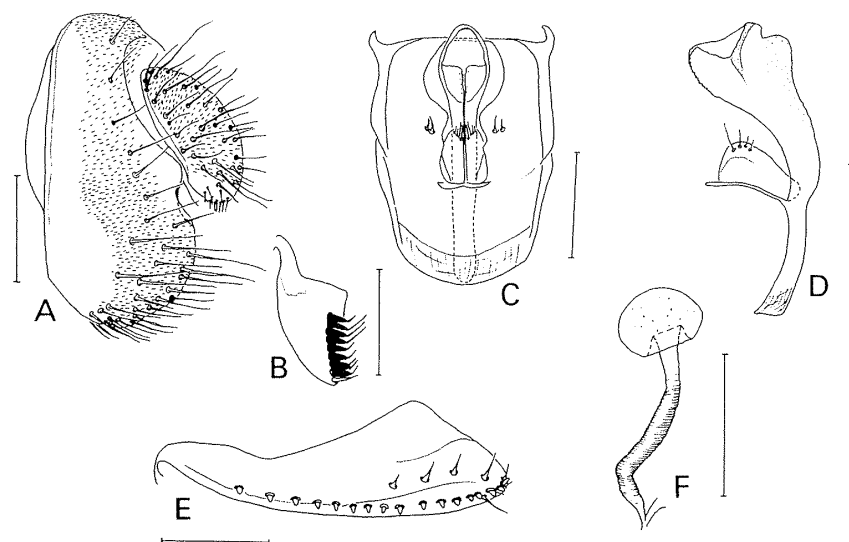


Fig. 12. *Drosophila (Drosophila) wangi* TODA et ZHANG, sp. nov. A, Epandrium and cercus (lateral view); B, surstylus; C, aedeagus, parameres and hypandrium (ventral view); D, aedeagus and paramere (lateral view); E, oviscapt; F, spermatheca. (Scale-line=0.1 mm.)

ical setae and a few setulae.

Thorax: Scutum yellow, with 3 pairs of brown, longitudinal stripes: inner pair paler, running between dorsocentral setae, slightly divergent behind anterior dorsocentrals, continuing to stripes on scutellum; middle pair starting slightly posteriorly from anterior margin, running along dorsocentral lines, ending before posterior dorsocentrals; outer pair running from anterolateral corners just above postpronotal lobes to bases of outer postalars, interrupted at transverse suture. Scutellum yellow, with 1 pair of brown, longitudinal, posteriorly obscure stripes. Mesopleuron yellow, with 3 obscure, brown, longitudinal stripes: upper one from upper part of episternum to base of wing, middle one short, at middle of mesopleuron, lower one running through length of ketepisternum. Postpronotal lobe yellow; postpronotal setae 2, upper one longer. Acrostichal setulae in 6 rows. Basal scutellar setae divergent; apicals convergent and crossed.

Wing hyaline. Veins yellow; r-m and dm-cu crossveins clear. R_{2+3} slightly curved to costa at tip. R_{4+5} and M_1 nearly parallel. C_1 setae 2, subequal. Halter white.

Legs yellow; 5th tarsomeres brownish. Fore femur with row of *ca.* 10 stout, black, ctenidial, larger and smaller spines alternating on distal 2/3 and another prominent one at base of row. Preapical dorsal setae on all tibiae; apical seta on mid tibia. Fore 1st tarsomere as long as 3 succeeding tarsomeres together; mid and hind 1st tarsomeres each as long as the rest together.

Abdominal tergites yellow; 2nd with medially interrupted, brown caudal band; 3rd to 5th each with 2 pairs of brown spots; 6th with 1 pair of brown spots.

Male terminalia (Fig. 12A–D): Epandrium ventrally broad and round on margin, pubescent except for anterior margin, with *ca.* 29 setae. Surstylus with *ca.* 8 primary prenisetae in nearly straight row on submedial to lower distal margin and a few small setae caudoventrally. Cercus oval, pubescent except for ventral margin, with *ca.* 31 long setae. Aedeagus with numerous spinules on dorsal surface. Paramere separate from hypandrium, somewhat oval, with *ca.* 4 setulae. Hypandrium rectangular.

Female terminalia: Oviscapt (Fig. 12E) apically round, with *ca.* 18 marginal and *ca.* 4 lateral ovisensilla; anteroventral bridge short, narrow. Spermatheca (Fig. 12F) shaped somewhat depressed ellipsoid, with minute punctules on surface; introvert *ca.* 1/3 height of capsule.

Measurements: BL=2.43 mm in ♂, 2.61 mm in ♀; ThL=1.17 mm in ♂, 1.20 mm in ♀; WL=2.53 mm in ♂, 2.55 mm in ♀; WW=1.13 mm in ♂, 1.12 mm in ♀.

Indices: arb=2/1; FW/HW=0.49 (0.45–0.53); ch/o=0.17; pror=0.89 (0.88–0.90); rcorb=0.41 (0.40–0.42); vb=0.36 (0.33–0.38); dcl=0.67;

sct1=0.98 (0.96–1.00); sterno=0.52 (0.50–0.55); orbito=0.75 (0.66–0.83); dcp=0.53; sctlp=0.98 (0.95–1.00); C=3.33 (3.27–3.40); 4c=0.73 (0.72–0.74); 4v=1.62 (1.50–1.74); 5x=1.47 (1.43–1.51); ac=2.26 (2.02–2.50); M=0.46 (0.44–0.47); C3F=0.31.

Holotype ♂, China: Mt. Emei, Sichuan Province, 1200 m alt., 19.VII. 1992, coll. M. J. TODA (IZB).

Allotype ♀, same data holotype (IZB).

Distribution. China (Sichuan).

Relationship. This species is related to *D. notostriata*, but distinguishable from the latter by the diagnostic characters.

Etymology. Patronym, in honor of Dr. Xing-jian WANG, Institute of Zoology, Academia Sinica, who helped us (M.J.T. & H.W.) in collecting the specimens.

Drosophila (Drosophila) eminentiula ZHANG et SHI, sp. nov.

(Fig. 13)

Diagnosis. Fore leg with brown patches on inner surface of femur and on distal 1/3 of tibia. Aedeagus with small, triangular projection dorsomedially and 1 pair of long, narrow, marginally serrate flaps dorsolaterally (Fig. 13C). Hypandrium without paramedian setae (Fig. 13B).

Some characters commonly seen in the foregoing species, *D. wangi*, are not referred to in the following description.

♂. Head: Eye brownish red. Fronto-orbital plate yellow. Facial carina high, narrow, not reaching buccal margin. Clypeus yellow. Pedicel yellow, anteriorly with brown stripe continued from stripe on frontal vitta;

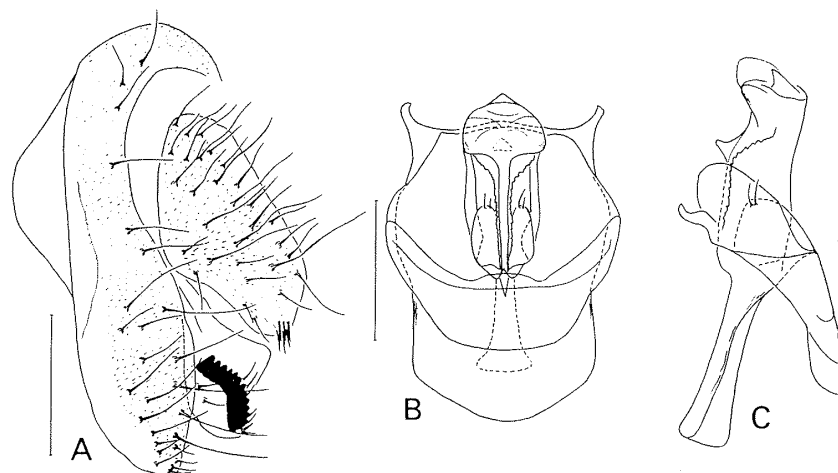


Fig. 13. *Drosophila (Drosophila) eminentiula* ZHANG et SHI, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, aedeagus, parameres and hypandrium (ventral view); C, ditto (lateral view). (Scale-line=0.1 mm.)

terminal bifurcation of arista large.

Thorax: Scutum with 4 pairs of brown, longitudinal stripes: inner pair running between dorsocentral setae and through entire length of scutum, continuing to stripes on scutellum; sub-inner pair paler, starting slightly posteriorly from anterior margin, running along dorsocentral lines, ending before posterior dorsocentrals; sub-outer pair paler, from transverse suture to bases of inner postalars; outer pair from anterolateral corners just above postpronotal lobes to bases of outer postalars, paler behind postpronotal lobes. Scutellum with 1 pair of brown, longitudinal stripes. Mesopleuron with 3 brown, longitudinal stripes: upper one from upper part of episternum to base of wing, middle one from middle part of anepisternum to base of halter, lower one broad, running through nearly entire length of katepisternum. Basal scutellar setae parallel.

Wing: C_1 setae subequal in length but upper one thicker. Halter pale yellow.

Legs: Fore femur with row of *ca.* 9 stout, ctenidial, larger and smaller spines alternating, sometimes 2 smaller spines between larger ones. Mid and hind tarsi without row of minute cuneiform setulae on underside.

Abdomen: Second to 5th tergites each with medially interrupted, obscure caudal band and 1 pair of lateral spots; 6th medially with 1 pair of brown spots.

Male terminalia (Fig. 13A–C): Epandrium ventrally moderate in width, almost entirely pubescent except for anterior margin, with *ca.* 26 setae. Surstylus with *ca.* 12 primary prensisetæ in convex row, *ca.* 3 stout setae on outer surface, *ca.* 3 stout spines on submedial inner surface and a few setulae caudoventrally. Cercus with *ca.* 30 long setae. Aedeagus distally slightly expanded and with small, transparent bulb. Paramere somewhat long, with *ca.* 2 setulae.

Measurements: BL=2.15 mm; ThL=1.00 mm; WL=2.35 mm; WW=1.00 mm.

Indices: arb=2/1; FW/HW=0.52; ch/o=0.19; pror=0.86; rcorb=0.57; vb=0.27; sterno=0.56; orbito=0.88; dcp=0.42; sctlp=1.40; C=3.23; 4c=0.75; 4v=1.65; 5x=1.41; ac=2.60; M=0.46; C3F=0.31.

Holotype ♂, China: Tenchong, Yunnan Province, 11.III. 1991, coll. W. ZHANG (KIZ).

Distribution. China (Yunnan).

Relationship. This species is special among the members of the *D. quadrilineata* species-subgroup in having the aedeagus dorsosubmedially with triangular, though vestigial, projection, which may or may not be homologous to aedeagal dorsal process seen in the *immigrans*, *nasuta* and *curviceps* species-subgroups, and can be distinguished from other members of the *D. notostriata* species-complex by the diagnostic characters.

Etymology. Referring to the small dorsal projection on aedeagus.

Drosophila (Drosophila) senticosa ZHANG et TODA, sp. nov.

(Fig. 14)

Diagnosis. Thorax nearly entirely yellow, without stripes. Acrostichal setulae in 8 rows. Aedeagus subproximally somewhat dilated and with numerous spinules on ventral surface (Fig. 14C). Hypandrium posteriorly with 1 pair of very long, broad plates covering lateral sides of aedeagus (Fig. 14C, E).

Some characters commonly seen in the foregoing species, *D. eminentiula*, are not referred to in the following description.

♂. Head: Ocellar triangle entirely yellowish. Frontal vitta entirely yellow, without brown stripe. Facial carina narrow, not so high. Gena and pedicel entirely yellow. Terminal bifurcation of arista moderate. Palpus yellow.

Thorax: Basal scutellar setae convergent.

Wing: Upper C_1 seta longer and thicker than lower one.

Legs yellow. Fore femur with row of *ca.* 11–14 stout, ctenidial, larger and smaller spines somewhat irregularly alternating. Mid and hind 1st tarsomeres each slightly longer than the rest together.

Male terminalia (Fig. 14A–E): Epandrium ventrally broad, somewhat perpendicular at caudoventral corner, almost entirely pubescent except for anterior margin and even on dorsal part of membrane between epandrium and cercus, with *ca.* 31 setae. Surstylus somewhat triangular, with *ca.* 13 primary prensisetae in nearly straight row on submedial to lower distal margin and a few

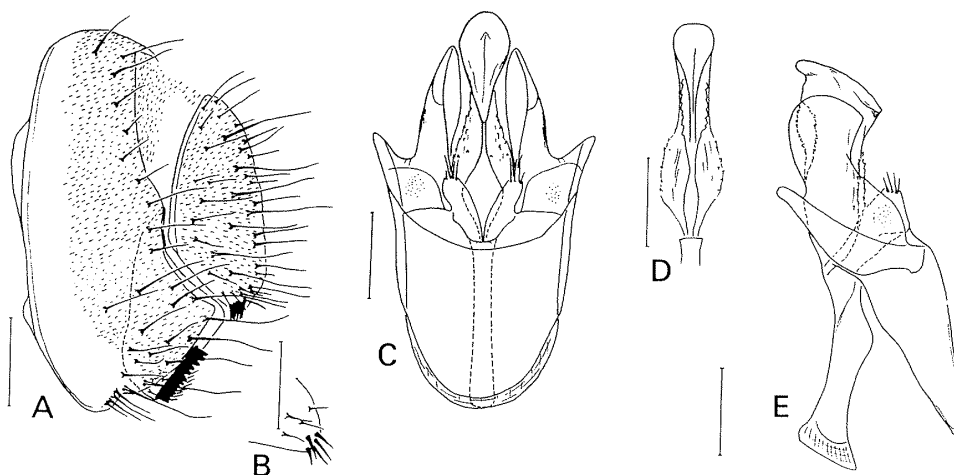


Fig. 14. *Drosophila (Drosophila) senticosa* ZHANG et TODA, sp. nov. A, Epandrium, surstylus and cercus (lateral view); B, caudoventral corner of cercus (ventral view); C, aedeagus, parameres and hypandrium (ventral view); D, aedeagus (dorsal view); E, aedeagus, paramere and hypandrium (lateral view). (Scale-line=0.1 mm.)

small setae or setulae caudoventrally on outer and inner surfaces. Cercus with *ca.* 38 long setae. Aedeagus subapically and basally narrowed in ventral view. Paramere with *ca.* 4 setulae.

Measurements: BL=3.02 mm (2.96–3.09), ThL=1.43 mm (1.32–1.54), WL=2.90 mm (2.84–2.96), WW=1.35 mm (1.32–1.39).

Indices: arb=2–3/1; FW/HW=0.46; ch/o=0.13 (0.12–0.13); prorb=0.87 (0.83–0.91); rcorb=0.50 (0.50–0.51); vb=0.39 (0.36–0.42); dcl=0.62 (0.60–0.64); scl=0.86 (0.79–0.93); sterno=0.51 (0.50–0.52); orbito=0.94 (0.88–1.00); dcp=0.40 (0.38–0.42), sclp=1.44 (1.33–1.56); C=3.80 (3.59–4.00); 4c=0.71 (0.68–0.75); 4v=1.75 (1.72–1.78); 5x=1.19 (1.00–1.38); ac=1.86 (1.79–1.93); M=0.47 (0.43–0.50); C3F=0.37 (0.36–0.38).

Holotype ♂, China: Shanlinxi, Taiwan, 15.X.1992, ex tree trunks, coll. M. J. TODA (EHU).

Paratype: 1♂, same data as holotype (IZT).

Distribution. China (Taiwan).

Relationship. This species is very unique among the members of the *D. quadrilineata* species-subgroup in having no longitudinal stripes on frons and thorax. *Drosophila nullilineata* ZHANG et TODA, 1988 also has no stripes on scutum but has two on mesopleuron. This species somewhat resembles the foregoing species, *D. eminentiula*, in having the aedeagus dorsolaterally with 1 pair of long, narrow, marginally serrate flaps, but can be distinguished from the latter by the diagnostic characters.

Etymology. Referring to the aedeagus subproximally with numerous spinules on ventral surface.

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Monoecious Life Cycle of the Tropical Aphid *Astegopteryx roepkei* (Homoptera)

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Key words: *Astegopteryx roepkei*; aphid; *Styrax*; gall; tropics.

Astegopteryx roepkei HILLE RIS LAMBERS (Aphididae, Hormaphidinae, Cerataphidini) forms a remarkable gall which is composed of thin, spirally-twisted tubular subgalls on *Styrax paralleloneura* in Sumatra (HILLE RIS LAMBERS, 1932; BLACKMAN & EASTOP, 1994). The life cycle of this species has been unknown up to now.

We found many galls of *A. roepkei* on a few trees of *S. paralleloneura* at Bandar Baru, Sumatra, on February 24, 1994. The galls contained many alates. Forty alates were taken from some galls and were confined in three glass vials with a piece of tissue paper to obtain 1st-instar offspring. On February 26, since a number of presumed 1st-instar nymphs were seen walking on the tissue paper, 80% ethanol was poured in the vials. They were later heated in KOH solution, stained with Evans' blue, and mounted